

METHODS, DEVICES, SYSTEMS AND COMPUTER PROGRAM PRODUCTS  
FOR OSCILLATING SHAFTS USING REAL TIME 3D ULTRASOUND

ABSTRACT

5           An oscillating shaft is scanned to provide images including the oscillating  
shaft *in vivo* in real-time with a real-time three-dimensional (3D) ultrasound scanner.  
An interventional device can be guided *in vivo* using an ultrasound scanner and  
includes a sheath having a bore therethrough from a proximal portion to a spaced-  
apart distal portion. A shaft has a proximal portion and a spaced-apart distal portion  
10       and is configured for insertion into the bore of the sheath. A vibrator is coupled to the  
proximal portion of the shaft and is configured to cause the distal portion of the shaft  
to oscillate at a shaft frequency. An isolator is coupled to the proximal portion of the  
sheath and to the vibrator, wherein the isolator is configured to reduce damping of an  
oscillation of the shaft by the sheath.

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